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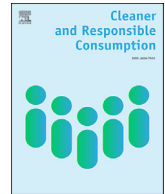
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# Leveraging intrinsically rewarding symbolic attributes to promote consumer adoption of plant-based food innovations

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## ABSTRACT

Food consumption has a significant environmental impact which can be alleviated when consumer adoption of plant-based food innovations is increased. Attempts to increase adoption are often tailored to instrumental product attributes that consumers find important, but our studies show this is not necessarily a prerequisite. The current work aims to examine the role of symbolic product attributes in predicting consumers' adoption intention (Study 1) and whether symbolic product attributes can be leveraged to affect behavioural adoption of a plant-based food innovation (Study 2). Our online study (Study 1) shows that consumers indicate they find symbolic product attributes less important, relative to instrumental considerations like price. However, evaluations of symbolic attributes tied to consumers' self-identity significantly predict consumers' intention to adopt a plant-based food innovation. At least part of the underlying mechanism pertains to the intrinsic reward of acting sustainably: symbolic attributes predict adoption intention via the feel-good factor of consuming a plant-based food innovation, particularly for consumers with a strong intrinsic motivation to act environmentally-friendly. In a field experiment in a supermarket (Study 2), we found that mainly stressing symbolic attributes tied to social status promotes behavioural adoption, more so than when symbolic attributes tied to self-identity are stressed in a promotional campaign. Together, the studies suggest that leveraging intrinsically rewarding symbolic attributes of plant-based food innovations can be an alternative way to promote consumer adoption.

## 1. Introduction

The large impact of food consumption on climate change issues has been well-documented, particularly regarding meat consumption (Poore and Nemecek, 2018; Springmann et al., 2018; Tilman and Clark, 2014; Willett et al., 2019). Longer-existing (non-innovative) meat alternatives such as pulses (Jallinoja et al., 2016) are gradually being complemented in Western markets by novel, plant-based food innovations such as seaweed products (Mohamed et al., 2012) and plant-based options that mimic their meat counterpart (Curtain and Grafenauer, 2019). Despite this increase in availability of plant-based food innovations in Western markets (Curtain and Grafenauer, 2019), adoption of plant-based food innovations remains relatively low (e.g., Haggmann et al., 2019). The European market for plant-based food is expected to grow (Aschemann-Witzel et al., 2021), in line with a 49% growth in sales of plant-based food in Europe in the period 2018–2020 (ProVeg, 2021). However, global meat consumption is currently projected to increase as

well, driven by for instance population growth and rising incomes in developing countries (Whitnall and Pitts, 2019) which would extend a trend from recent decades which saw diets become more meat-heavy (Sahlin et al., 2020). Plant-based food innovations remain niche products (Siegrist and Hartmann, 2019), which deal with negative consumer associations relative to meat products, in terms of for instance price and tastiness (Michel et al., 2021). This leads to the question how plant-based food innovations can be effectively promoted to increase its appeal to consumers and increase adoption, to contribute to alleviating the environmental impact of global food consumption.

### 1.1. Appeals to symbolic product attributes to promote consumer adoption

Campaigns to promote sustainable food consumption often appeal to instrumental product attributes that consumers state they find important; particularly price, convenience (in terms of use and/or purchase) and sensory appeal (taste and texture; e.g., Januszewska et al., 2011). These

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three instrumental product attributes often affect consumers' food choices (Steenhuis et al., 2011). Similarly, consumers generally indicate environmental product attributes as important (Kause et al., 2019), which reflect outcomes of product use for the environment (Dittmar, 1992), in terms of CO<sub>2</sub>-emissions. Consumers often consider such environmental attributes in their food choices (Camilleri et al., 2019; Graham and Abrahamse, 2017). The role of symbolic product attributes has been relatively unexplored in promoting adoption of plant-based food innovations (van den Burg et al., 2021), even though food has been argued to carry possible symbolic value for consumers (Birch et al., 2019; Perrea et al., 2017). Symbolic product attributes reflect outcomes of product use for consumers' self-identity and/or social status (Dittmar, 1992; Noppers et al., 2014), i.e. when consumers use a product this has potential implications for how consumers see themselves (self-identity; Gatersleben and Van der Werff, 2018; Noppers et al., 2014) and/or how positively consumers are viewed by others (social status; Griskevicius et al., 2010; Noppers et al., 2014). Product adoption creates symbolic value for consumers when consumers derive certain meaning from product ownership and/or use (Ravasi and Rindova, 2008), tied to expressions of self-identity and/or social status. To our knowledge, no research has focused on how symbolic attributes can be leveraged to promote adoption of plant-based food innovations and what the underlying psychological process is.

Consumer evaluations of symbolic attributes have been shown to affect adoption of sustainable innovations such as electric vehicles and smart energy systems (Noppers et al., 2014), in addition to evaluations of environmental and instrumental attributes (Noppers et al., 2015). Thus, the more consumers evaluate that these innovative products possess symbolic attributes, the more likely adoption becomes. This is the case even though consumers state they find symbolic attributes relatively unimportant as a motive for adoption (Noppers et al., 2014). The latter indicates that consumers either do not know what drives their behaviour or that they do not want to acknowledge this (Nolan et al., 2008). Regarding plant-based food innovations, consumers might not want to acknowledge what drives their behaviour, for concerns of being disapproved by others as a result of acting morally (moral reproach; Bolderdijk and Cornelissen, 2022; Minson and Monin, 2012) or stigmatization for norm-deviating behaviour (Markowski and Roxburgh, 2019). Given the relative novelty of plant-based food innovations in Western markets, consumers may also simply not know of potential benefits of plant-based innovations (Myers and Pettigrew, 2018), making it difficult for consumers to estimate what drives their behaviour. However, consumers can derive more symbolic value from product adoption when these products are not mass consumed, because this allows for the possibility to distinguish oneself by adopting such products (Berger and Heath, 2007; Hunt et al., 2013). Given the relatively low adoption rate of plant-based food innovations, it can be expected that these novel plant-based products carry this possibility to distinguish oneself with it. Noppers et al. (2014) also reason that mainly innovative products thus carry potential for consumers to derive symbolic value from, even though consumers may not consciously realize this. Consequently, we hypothesize that:

**H1.** evaluations of symbolic attributes predict plant-based food innovation adoption intention, even though consumers indicate symbolic product attributes of a plant-based food innovation to be relatively unimportant, as a motive for adoption.

Consumers can derive symbolic value from (sustainable) innovation adoption, either because owning and/or using such an innovation creates meaning as something is signified to oneself (self-identity; Gatersleben and Van der Werff, 2018) or to others (social status; Griskevicius et al., 2010; Puska et al., 2018). To our knowledge, no research has yet distinguished between symbolic value from these different forms of symbolic attributes, tied to either self-identity or social status, in a single study. Exploratory, we examine the relative predictive strength of these two types of symbolic attributes on plant-based food innovation adoption

(both adoption intention and behavioural adoption). Also, previous research has indicated that mainly innovations carry strong potential to derive symbolic value from as a consumer because innovations are more costly to adopt, in terms of (behavioural) costs (Berger and Heath, 2007; Hunt et al., 2013; Noppers et al., 2014). Plant-based food innovations can also be characterized as costly to adopt, given relatively negative consumer associations regarding price and tastiness relative to meat products (Michel et al., 2021). Therefore, we expect that:

**H2.** symbolic attributes affect adoption intention of a plant-based food innovation, but not adoption intention of a non-innovative plant-based food product.

### 1.2. Intrinsic rewards as an underlying mechanism to leverage symbolic attributes

The question remains why symbolic attributes would affect plant-based food innovation adoption: do greater perceived symbolic attributes coincide with stronger anticipated positive emotions and in turn adoption, an indication that adoption is perceived as intrinsically rewarding by consumers? A better understanding of (part of) this underlying mechanism can contribute to ultimately more effectively leverage symbolic attributes of a plant-based food innovation to promote adoption. Making sustainable choices has been shown to be intrinsically rewarding; this intrinsic reward is reflected in a feel-good factor of acting sustainably (Taufik et al., 2015; Van Der Linden, 2015), also known as a figurative "warm-glow" (Jia and Van der Linden, 2020; Taufik, 2018; Van Der Linden, 2015). When consumers are intrinsically motivated to act environmentally-friendly (i.e., feeling a moral obligation to perform a certain behaviour; Van der Werff et al., 2013), anticipated positive emotions foster sustainable choices (Taufik et al., 2016; Van Der Linden, 2015; van der Linden, 2018). Immediate "warm-glow" feelings can increase the likelihood that consumers adopt sustainable behaviours, as proposed by White et al. (2019). Extending this reasoning, we propose that symbolic value of plant-based food innovations triggers anticipated positive emotions (i.e., "warm-glow" feelings; consumers anticipating that adoption would make them feel good about themselves) because these symbolic attributes make adoption intrinsically rewarding. In turn, greater anticipated positive emotions increases the likelihood of adoption. Thus, we formulate the following hypothesis:

**H3A.** the more symbolic attributes consumers evaluate a plant-based food innovation to have, the more positive emotions consumers anticipate when adopting, in turn increasing the intention to adopt the plant-based food innovation.

Differences between different groups of consumers can be expected regarding the extent to which symbolic attributes trigger "warm-glow" feelings. Particularly individuals who are intrinsically motivated to act pro-environmentally show a relation between the meaningfulness of sustainable actions and how these actions make them feel (Venhoeven et al., 2020). Thus, "warm-glow" feelings are particularly likely to be experienced as a result of actions that signify something positive about oneself (Taufik et al., 2015). The latter suggests an intrinsic motivational basis of consumers' sustainable actions, which leads to these "warm-glow" feelings (Van Der Linden, 2015). Here, intrinsic motivation is obligation-based which concerns the extent to which consumers experience a moral obligation to perform a behaviour, which is conceptually related to personal norm (Van der Werff et al., 2013). Consequently, particularly consumers with a strong intrinsic motivation to engage in sustainable actions are expected to be susceptible for symbolic attributes of plant-based innovations, as adoption of these products can make them feel good about themselves. Thus, we expect that:

**H3B.** the more consumers evaluate plant-based food innovations to have symbolic attributes, the stronger anticipated positive emotions and in turn adoption are; particularly among individuals who have a relatively strong intrinsic motivation to act sustainably.

## 2. Study 1

### 2.1. Participants

An online survey was conducted with 969 participants. The participants were recruited by a market research agency using a Dutch consumer panel (October 2019;  $M_{age} = 48.9$ ; 51.3% female, 48.6% male, 0.1% other/unknown; educational level: 1.1% primary education, 30.9% secondary education, 31.7% vocational education, 36.2% high education; annual household income level: 25.3% less than 30,000 Euro, 22.3% 30,000–39,999 Euro, 25.9% 40,000–69,999 Euro, 8.4% 70,000–99,999 Euro, 2.3% 100,000 Euro or more; 15.9% unknown). The market research agency was asked to draw a sample that was representative for the Dutch population in terms of age, sex, education level and income level. All questions in the survey needed to be answered by participants, with the exception of the questions concerning demographics for which participants could indicate they preferred not to answer these. Participants collected points for their participation which they could save and exchange for products/gifts. Informed consent was contained from all participants. The study was approved by an Ethical Committee of a Dutch university. To make sure our sample size for each version of the survey was large enough to have sufficient power, we checked the minimum required sample size by performing a power analysis using G\*Power 3.1.9.7 (Faul et al., 2007). Results of this analysis showed that our sample size was above the threshold of 311 participants per survey version.

### 2.2. Design, procedure & measures

Participants were first randomly assigned to one of two survey versions: a version about seaweed ( $n = 478$ ) and a version about pulses (beans;  $n = 491$ ). Seaweed and pulses were chosen based on previous findings indicating that consumers view seaweed as an innovative food product and pulses as a non-innovative food product (Onwezen et al., 2019). The survey was identical for both subsamples, other than the type of product the survey was completed for.

Measures for the perceived importance and for the evaluation of instrumental, environmental and symbolic product attributes, as well as adoption intention, were based on survey scales used in previous research (Noppers et al., 2014). Instrumental attributes were adjusted for the food domain, and divided in price, convenience and sensory aspects based on studies indicating these are primary instrumental food product attributes for consumers (Januszewska et al., 2011). Participants were first asked to indicate to what extent they find instrumental (price, convenience, sensory appeal), environmental and symbolic product attributes to be important for them by finishing the sentence “I find it important that seaweed [beans] ...” with various items that correspond to instrumental, environmental or symbolic attributes (self-identity; social status, using a 7-point Likert scale from 1 = very unimportant to 7 = very important). Subsequently, participants were asked to evaluate to what extent they believed the product actually had these instrumental, environmental and symbolic product attributes by finishing the following sentence: “Seaweed [beans] to eat as a food product ...”. The same items were used to first measure the importance of these attributes, and subsequently the evaluation of these attributes for participants. Instrumental product attributes consisted of price (is affordable, is cheap; Cronbach's  $\alpha = 0.81$ ), convenience (is easy to prepare, costs little time to prepare; Cronbach's  $\alpha = 0.86$ ) and sensory appeal (smells good, tastes good; Cronbach's  $\alpha = 0.79$ ), all on a 1–7 scale with 1 = completely disagree; 7 = completely agree. Environmental product attributes were measured with four items, finishing the same sentence (is produced in an environmentally-friendly manner, contributes to a low as possible CO<sub>2</sub>-emission, is produced locally, is produced in a way that does not harm the environment; Cronbach's  $\alpha = 0.88$ ). Symbolic product attributes related to self-identity were measured with two items (contributes positively to how I want to see myself, says positive things about me as a

person; Cronbach's  $\alpha = 0.86$ ), and symbolic attributes related to social status were measured with three items (distinguishes me positively from others, leads to positive reactions from others, gives me the image of someone who gives the right example; Cronbach's  $\alpha = 0.89$ ).

Next, we measured anticipated positive emotions in relation to eating seaweed [beans] (“To what extent do you believe you would experience the following emotions when eating seaweed [beans]?”; happy, enthusiastic, optimistic, pride, satisfaction; Cronbach's  $\alpha = 0.94$ ; Koenig-Lewis et al., 2014). Subsequently, questions were asked on adoption intention (“How likely is it that in the next 3 months you will “; eat seaweed [beans], consider buying seaweed [beans], go online to look for recipes containing seaweed [beans], Cronbach's  $\alpha = 0.86$ ; 1 = very unlikely; 7 = very likely). Finally, we measured intrinsic motivation to act environmentally-friendly (“I have a moral obligation to protect the environment”, “I feel that I should protect the environment”, “I feel that it is important that people in general protect the environment”, “Because of my own values, I feel I ought to behave in an environmentally-friendly manner”; Cronbach's  $\alpha = 0.94$ ; 1 = completely disagree; 7 = completely agree; Gärling et al., 2003).

All variables were standardized for the analyses. The mean scores on these variables are reported in Tables 1 and 2 for the two subsamples in the study, along with the zero-order correlations between the variables.

### 2.3. Results & discussion

Of the participants who completed the survey for seaweed products (plant-based food innovation), 52.9% of the participants indicated to have never eaten anything containing seaweed, while 9.0% indicated to eat something containing seaweed on a monthly basis. Of the participants who completed the survey for pulses (non-innovative plant-based food), 4.3% of the participants indicated to have never eaten pulses (beans) and 78.2% indicated to eat something containing pulses (beans) on a monthly basis. This indicates that seaweed is a relatively innovative plant-based food product for the study sample given the relatively low current adoption rate. Pulses can be considered to be more non-innovative as the relatively high adoption rate indicates it is consumed on a more mainstream level, in line with findings of Onwezen et al. (2019).

As expected, participants indicated they found symbolic attributes least important as a motive for adoption, relative to the three types of instrumental attributes and environmental attributes (Fig. 1). To test whether evaluations of symbolic attributes predict the adoption intention of a plant-based food innovation (seaweed), we conducted a regression analysis in which we regressed adoption intention on evaluations of instrumental (price, convenience, sensory appeal), environmental and symbolic (self-identity, social status) attributes. As hypothesized, the more participants evaluated seaweed to have symbolic attributes, the higher their adoption intention, despite symbolic attributes being rated as the least important adoption motive ( $H_1$ ). Only symbolic attributes tied to self-identity predicted participants' intention to adopt seaweed; symbolic attributes tied to social status was not a significant predictor (all statistics are reported in Table 3). Environmental attributes also significantly predicted adoption intention, while only one type of instrumental attribute (sensory appeal) significantly predicted adoption intention. Similar analyses were conducted for the subsample of participants who completed the survey for non-innovative plant-based food (pulses): symbolic attributes did not significantly predict pulses (beans) adoption intention (Table 4), in line with  $H_2$ . Only environmental attributes and one type of instrumental attributes (sensory appeal) were predictive of participants' intention to adopt pulses (beans).

We used a moderated mediation model (SPSS PROCESS model 7; 5000 bootstrapping samples; Hayes, 2012; Hayes, 2018) to test  $H_{3A}$  and  $H_{3B}$ . We used seaweed adoption intention as the dependent variable, evaluation of symbolic attributes as the independent variable, anticipated positive emotions as a mediator and intrinsic motivation to act environmentally-friendly as a moderator to examine the hypothesized conditional indirect relation. As expected, the more participants evaluate

**Table 1**  
Correlations among and Descriptive Statistics for Study 1 Variables (Subsample plant-based food innovation; Nseaweed = 478).

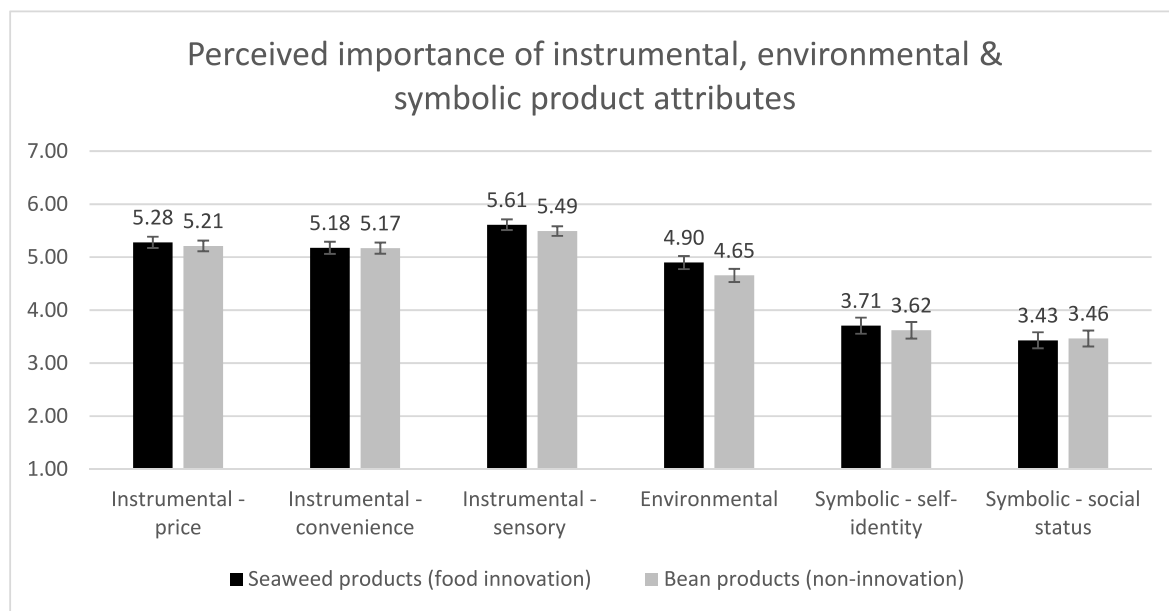
Variables	M (SD)	1	2	3	4	5	6	7	8	9
1. Instrumental attributes - price	4.51 (1.11)									
2. Instrumental attributes - convenience	4.75 (1.12)	<i>.66</i>								
3. Instrumental attributes - sensory	4.51 (1.35)		<i>.63</i>							
4. Environmental attributes	4.73 (1.13)			<i>.48</i>						
5. Symbolic attributes – self-identity	4.00 (1.45)				<i>.37</i>					
6. Symbolic attributes – social status	3.98 (1.37)					<i>.33</i>				
7. Positive emotions adoption	3.71 (1.61)						<i>.40</i>			
8. Intrinsic motivation to act sustainably	5.05 (1.36)							<i>.47</i>		
9. Adoption intention	3.44 (1.81)								<i>.37</i>	

Notes. All reported correlations in italic are statistically significant ( $p < .05$ ).

**Table 2**  
Correlations among and Descriptive Statistics for Study 1 Variables (Non-innovative plant-based food; Npulses = 491).

Variables	M (SD)	1	2	3	4	5	6	7	8	9
1. Instrumental attributes - price	5.32 (1.06)									
2. Instrumental attributes - convenience	5.34 (1.14)	<i>.60</i>								
3. Instrumental attributes - sensory	5.17 (1.13)		<i>.52</i>							
4. Environmental attributes	4.65 (1.17)			<i>.31</i>						
5. Symbolic attributes – self-identity	3.91 (1.56)				<i>.42</i>					
6. Symbolic attributes – social status	3.88 (1.51)					<i>.30</i>				
7. Positive emotions adoption	4.02 (1.53)						<i>.56</i>			
8. Intrinsic motivation to act sustainably	5.08 (1.28)							<i>.86</i>		
9. Adoption intention	4.75 (1.41)								<i>.64</i>	

Notes. All reported correlations are statistically significant ( $p < .05$ ).



**Fig. 1.** Means of perceived importance instrumental, environmental & symbolic attributes Study 1 (including standard error bars; 1–7 survey scale).

**Table 3**  
Summary of multiple regression analysis for variables predicting intention to adopt a plant-based food innovation (seaweed; study 1).

Variable	$\beta$	t	Sig.	95% CI for $\beta$	Sq. Semi-partial corr.	Cohen's $f^2$	VIF
Instrumental attributes – price	-.10	-1.87	.062	[-.20, .01]	.001	.007	1.96
Instrumental attributes – convenience	.09	1.47	.143	[-.03, .21]	<.001	.005	2.73
Instrumental attributes – sensory	.31	5.37	<.001	[.19, .43]	.040	.061	2.31
Environmental attributes	.13	2.41	.016	[.02, .23]	.008	.012	2.03
Symbolic attributes – self-identity	.28	3.51	<.001	[.12, .43]	.017	.026	4.48
Symbolic attributes – social status	-.02	-.20	.842	[-.17, .14]	<.001	.000	4.47

Notes. Adj.R2 = 0.334, F = 40.90 ( $p < .001$ ).



**Table 4**  
Summary of multiple regression analysis for variables predicting intention to adopt a non-innovative sustainable food product (pulses; study 1).

Variable	$\beta$	<i>t</i>	<i>Sig.</i>	95% CI for $\beta$	Sq. Semi-partial corr.	Cohen's $f^2$	VIF
Instrumental attributes – price	-.01	-.11	.913	[-.10, .09]	<.001	.000	1.76
Instrumental attributes – convenience	.08	1.69	.092	[-.01, .18]	<.001	.006	1.71
Instrumental attributes – sensory	.33	6.92	<.001	[.23, .42]	.066	.099	1.61
Environmental attributes	.23	4.71	<.001	[.14, .33]	.031	.046	1.76
Symbolic attributes – self-identity	.11	1.53	.127	[-.03, .26]	.003	.005	4.00
Symbolic attributes – social status	-.01	-.08	.940	[-.16, .14]	<.001	.000	4.22

Notes. Adj.R2 = .322, F = 39.81 (p < .001).

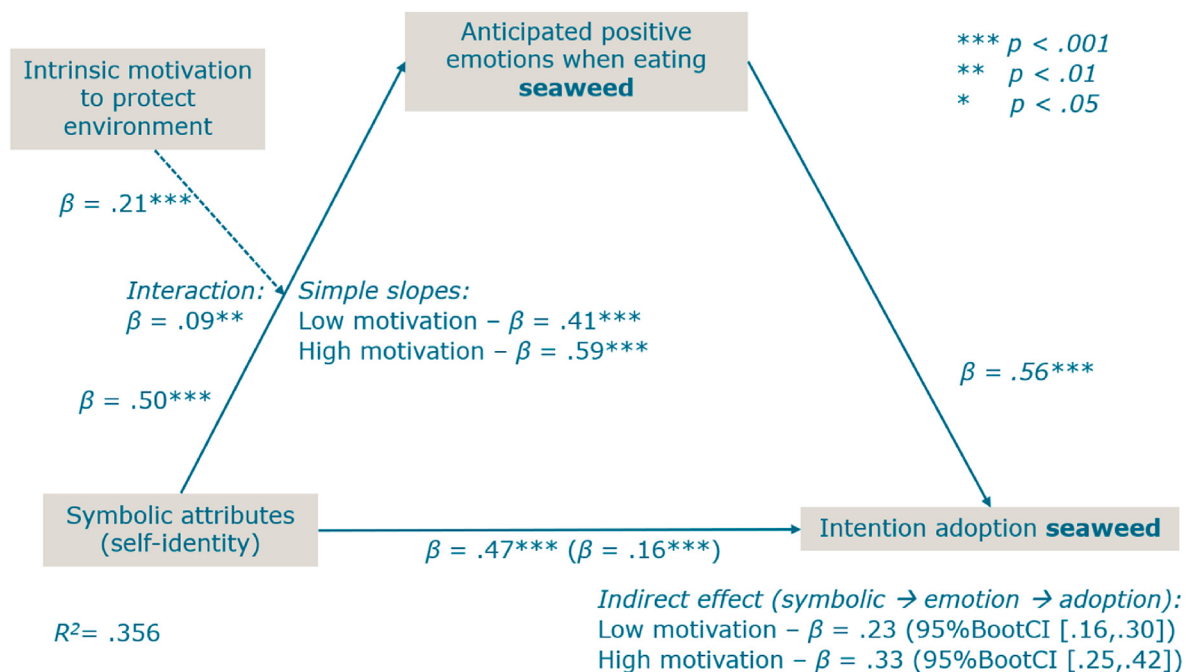
seaweed products to have symbolic attributes tied to self-identity, the more positive emotions they anticipate when adopting; in turn, the greater the anticipated positive emotions, the higher the intention to adopt seaweed products (H<sub>3A</sub>). This can be seen in the significant indirect relation, across levels of intrinsic motivation to act environmentally-friendly (all statistics are reported in Fig. 2). Furthermore, in line with H<sub>3B</sub> the moderated mediation model revealed that the hypothesized indirect relation was conditional on the level of intrinsic motivation to act environmentally-friendly (Fig. 2; 95% bootstrapped CI [0.01, 0.09] moderated mediation index). More specifically, this indirect relation was stronger for participants with a relatively strong intrinsic motivation to act environmentally-friendly (+1SD above mean;  $\beta = 0.33$ , 95% bootstrapped CI [0.25, .42]), relative to participants with a relatively weak intrinsic motivation (-1SD below mean;  $\beta = 0.23$ , 95% bootstrapped CI [0.16, .30]). Symbolic attributes tied to social status did not significantly predict adoption intention. However, as indirect-only mediation is theoretically possible (Zhao et al., 2010), we did run this model (see Fig. 3 for all statistics). There was a significant indirect relation between symbolic attributes (social status) and intention to adopt seaweed via anticipated positive emotions, conditional on the level of intrinsic motivation to act environmentally-friendly (95% bootstrapped CI [0.01, 0.09]). The indirect relation between symbolic attributes (social status) and adoption via anticipated positive emotions was stronger for participants with a relatively strong intrinsic motivation (+1SD above mean;  $\beta = 0.32$ , 95% bootstrapped CI [0.24, .40]), rather than a relatively weak intrinsic motivation (-1SD below mean;  $\beta = 0.22$ , 95% bootstrapped CI [0.15, .29]).

Study 1 revealed that stronger evaluations of symbolic attributes of a plant-based food innovation (tied to consumers' self-identity) predict adoption intention, even though participants indicated to find symbolic attributes relatively unimportant as an adoption motive. Symbolic value tied to social status did not have a similar effect. However, both types of symbolic attributes share the common denominator of creating meaning for consumers, the nuance being whether this meaning is created by signifying something to oneself or to others by adopting a product (Gatersleben and van der Werff, 2018). In Study 2 we further studied the relevance of symbolic attributes in a natural setting by attempting to leverage symbolic attributes of a plant-based food innovation to promote adoption in promotional campaign materials where the two types of symbolic attributes are disentangled. The main purpose of Study 2 was to exploratory further examine the relative predictive strength of the two types of symbolic attributes, in this case on actual behavioural plant-based food innovation adoption instead of adoption intention, to prevent intention-behaviour gap issues (Webb and Sheeran, 2006). Based on the findings of Study 1, it would be expected that symbolic attributes tied to consumers' self-identity are particularly likely to affect adoption.

### 3. Study 2

#### 3.1. Participants, design & measures

Study 2 was conducted in a supermarket in the city centre of The Hague, The Netherlands (February 2020). Potential participants were



**Fig. 2.** Moderated mediation model Study 1: conditional indirect relation between symbolic attributes tied to self-identity and intention to adopt seaweed via anticipated positive emotions.

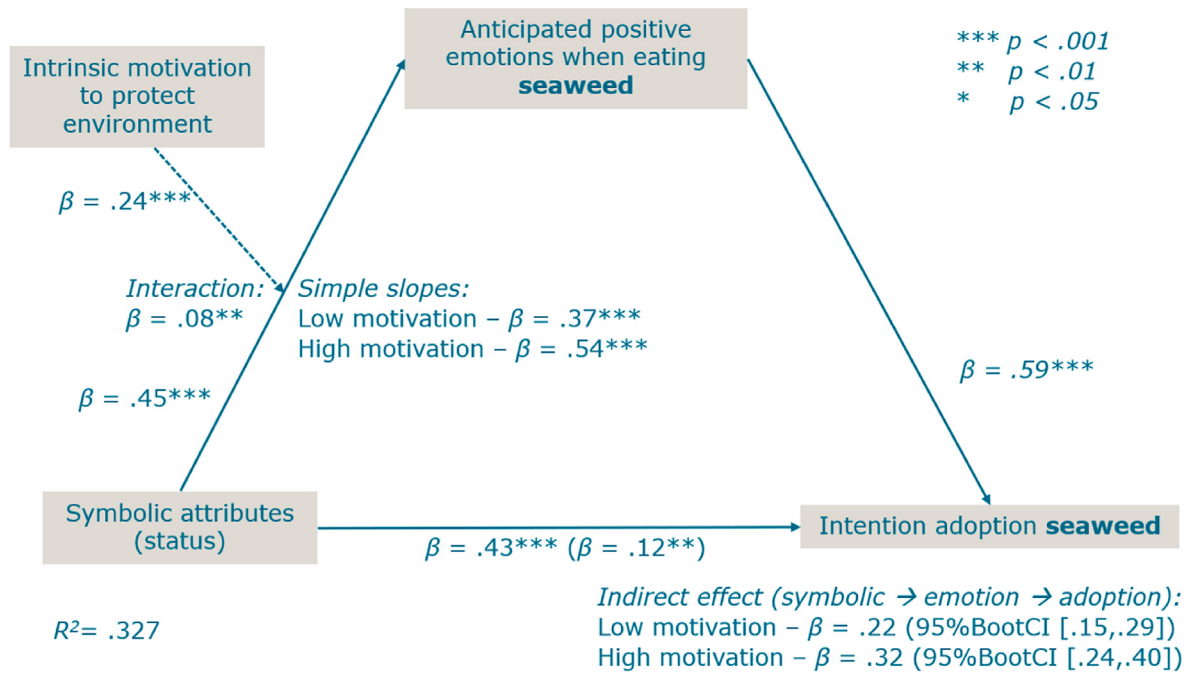


Fig. 3. Moderated mediation model Study 1: conditional indirect relation between symbolic attributes tied to social status and intention to adopt seaweed via anticipated positive emotions.

customers that entered the supermarket. The study was approved by an Ethical Committee of a Dutch university.

The study had an experimental design, in which one of three types of promotional pop-up banners were placed, on a location just after entering the supermarket. The different banners promoted adoption of seaweed products and only differed in terms of the slogan used and a corresponding icon, stressing either symbolic attributes tied to self-identity (“Because sustainability fits with who you are”), symbolic attributes tied to social status (“Because you show what sustainability is”<sup>1</sup>), or no specific attributes of seaweed were stressed. The bottom of each banner read “Want to try? Take a coupon and exchange this for a seaweed product”. Each type of banner was placed for two days between 11.30am and 6.30pm, for one weekday in one week and one (different) weekday in the following week. Coupons were placed in a basket next to the banner, with a note stating that a maximum of one coupon per person could be taken. On the flipside of the coupons specific dates were indicated on which customers could exchange the coupon. The coupons could be exchanged at the supermarket’s service desk over a 3-day period in the week following the two weeks in which a banner was placed. The front of the coupons showed the same slogan and icon, as the corresponding banner (see Supplementary Material). The banners and coupons were designed by a graphic designer.

We used two behavioural adoption measures: 1. The number of coupons that were taken per type of banner/coupon, 2. The number of coupons that were exchanged for a seaweed product per type of banner/coupon. Both measures were corrected for the number of customers that walked by each type of banner. The second outcome measure was additionally corrected for the number of coupons taken per type of banner, to get an indication how many of the coupons taken were actually exchanged for a seaweed product. Particularly the second adoption measure can be considered actual behavioural adoption, as this action resulted in a customer taking home the seaweed product.

A research assistant was on a location in the supermarket where customers could unobtrusively be observed and tallied all customers that

actually walked by the banner, using a tally counter (the same research assistant was present in the supermarket each day). This way, we were able to register how many customers passed by each type of banner and had the opportunity to take a coupon from the basket adjacent to the banner. Tallies showed that 1063 customers passed by the banner which stressed symbolic attributes tied to self-identity, 1206 customers passed by the banner which stressed symbolic attributes tied to social status and 1176 customers passed by the control group banner. The research assistant also kept track that customers only took a maximum of one coupon. After the 3-day period finished in which coupons could be exchanged, all exchanged coupons were tallied. 3445 customers had entered the supermarket and walked passed the banner; 512 customers took a coupon, and 50 customers exchanged a coupon for a seaweed product. For this study, a power analysis was also performed using G\*Power 3.1.9.7 (Faul et al., 2007), which indicated a minimum needed sample size of 964. Given the real-life nature of the study and its practical limitations (i.e., we were only able to conduct the study in the supermarket for a limited agreed upon number of days, and the coupons had three specific dates listed on which the coupon could be exchanged which made it impossible to extend the study), this final sample size was what was possible in terms of practical feasibility.

### 3.2. Results & discussion

A chi-squared test showed that the number of coupons taken did not differ between conditions:  $\chi^2(2) = 2.52, p = .284$ , Cramer’s  $V = 0.027$ . The number of coupons that were exchanged for a seaweed product did differ between conditions, both relative to the number of customers that walked by each type of banner ( $\chi^2(2) = 6.04, p = .049$ , Cramer’s  $V = 0.047$ ) and relative to the number of coupons taken per type of banner ( $\chi^2(2) = 8.77, p = .013$ , Cramer’s  $V = 0.136$ ; Fig. 4). Z-tests to compare column proportions indicated that significantly more coupons were exchanged when symbolic attributes tied to social status were stressed, compared to when symbolic attributes tied to self-identity were stressed. These coupon return rates were 2.1% and 0.8% respectively, when corrected for the amount of customers that walked by the respective banners (Fig. 4). When corrected for the amount of coupons taken per type of banner, this amounted to coupon return rates of 14.8% and 5.2% (Fig. 4).

<sup>1</sup> The text on the banners was in Dutch (see Supplementary Material) and are translated here for the purpose of the manuscript.

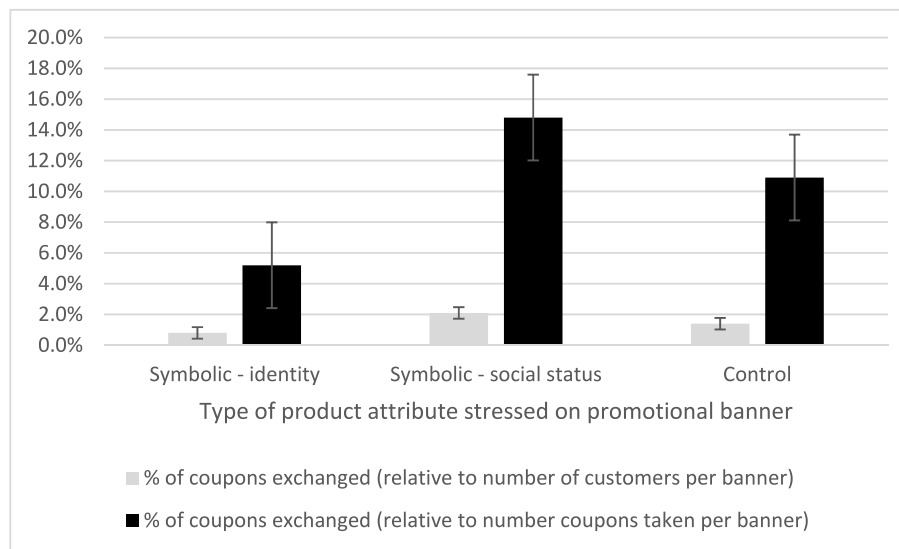


Fig. 4. Percentages of coupons exchanged for a plant-based food innovation product per type of stressed product attribute (including standard error bars; Study 2).

Differences between each of the experimental conditions relative to the control group were not statistically significant at  $p = .05$  based on Z-tests to compare column proportions.

The findings in Study 2 indicate that the type of symbolic attribute that was stressed mattered: stressing symbolic attributes tied to social status led to a higher adoption rate in the form of exchanging a coupon for a plant-based food product (seaweed product) relative to when symbolic attributes tied to self-identity were stressed on promotional campaign materials. However, compared to a control group, in which seaweed was promoted but without explicit referencing to symbolic product attributes, stressing either type of symbolic attribute on campaign materials did not lead to a higher adoption rate. Possibly, the relatively low sample size also played a role in why we did not detect statistically significant findings relative to the control group.

#### 4. General discussion

Understanding how adoption of plant-based food innovations can be effectively promoted among consumers is critical to alleviate the large impact of food consumption on climate change issues. The current work shows that even though consumers indicate to find symbolic attributes relatively unimportant as a motive for adopting a plant-based food innovation, this does not imply that symbolic attributes ultimately are irrelevant. The more symbolic attributes consumers evaluate a plant-based food innovation to have, the higher consumers' intention to adopt a plant-based food innovation, despite consumers stating symbolic attributes are unimportant as an adoption motive ( $H_1$ ; Study 1). This extends findings from non-food sustainable innovation domains, such as the domains of energy and electric cars (Noppers et al., 2015); our findings also indicate that symbolic attributes predict adoption intention of a plant-based food innovation, but not of a more traditional, non-innovative plant-based food product ( $H_2$ ; Study 1), in line with reasoning that symbolic value can mainly be derived from innovative products because these typically are more costly to adopt. Furthermore, to our knowledge, this paper is the first to examine a potential underlying mechanism of why symbolic attributes promote adoption of sustainable innovations in general, and specifically adoption of plant-based food innovations. Our findings indicate that part of this underlying mechanism pertains to the intrinsic reward of acting sustainably. Specifically, the more consumers evaluate a plant-based food innovation to have symbolic attributes, the more consumers anticipate to feel good about adoption, which in turn is positively related to adoption intention ( $H_{3A}$ ; Study 1). This indirect relation is particularly strong among consumers

who are strongly intrinsically motivated to act environmentally-friendly ( $H_{3B}$ ; Study 1). Emotions can be categorized as an individual determinant for consumers' eating behaviour (Stok et al., 2017). Schneider et al. (2021) provide an overview of studies showing how anticipated positive emotions promote pro-environmental actions, while also noting that there is no standardized approach how campaigns can best increase these anticipated positive emotions. Our findings indicate that one way to approach this, is to appeal to the symbolic value of pro-environmental actions. Such an appeal increases this anticipated feel-good ("warm-glow") effect and in turn is positively associated with engaging in pro-environmental actions, by means of adopting a plant-based food innovation. Our work also builds on studies showing that "warm-glow" feelings are elicited because sustainable actions send a positive self-signal (Taufik et al., 2015), thus making it intrinsically rewarding to act sustainably (Van Der Linden, 2015). The current study indicates that the symbolic value of sustainable actions in the form of adopting plant-based food innovations is intrinsically rewarding, consequently increasing consumers' intention to adopt a plant-based food innovation.

Furthermore, in exploratory fashion we examined the relative predictive strength of different forms of symbolic attributes on plant-based food innovation adoption (Study 1 & 2). Ownership and use of such innovations can create symbolic value by signifying something to oneself (self-identity) or to others (social status; Gatersleben and van der Werff, 2018), but previous research has not yet compared the relative effect of the two types of symbolic attributes on adoption. Study 1, conducted online, shows that stronger evaluations of symbolic attributes tied to consumers' self-identity (but not social status) predict consumers' intention to adopt a plant-based food innovation. Our follow-up field experiment (Study 2) shows that designing promotional campaign materials in a way in which symbolic attributes tied to social status are stressed promotes actual behavioural adoption of a plant-based food innovation more so than stressing symbolic attributes tied to self-identity. While empirically contradicting, we argue the different types of environments in which the respective studies were conducted, and differences in our adoption measures might have played a role. Research has shown that more social status can be derived from sustainable actions when these actions are costly, visible and/or effortful (Uren et al., 2019). Also, environmental self-identity particularly affects environmental decision-making in private-sphere settings (Gkargkavouzi et al., 2019). In our field experiment, behavioural adoption in the form of returning to the supermarket to exchange a coupon for a seaweed product might have been relatively effortful for consumers, but also visible as coupon exchange occurred at a service desk where others could witness the



behaviour. In the online survey, adoption was measured by indicating an intention to buy seaweed products in the short-term (hence less effortful than the field experiment's behavioural measure), while the online environment was also a more private-sphere setting. Furthermore, in the field experiment stressing the two types of symbolic attributes showed no differential effect on adoption in the form of taking a coupon home. One potential reason for this might be that this form of adoption was less effortful and visible than making a separate trip to the supermarket to exchange the coupon. Hence, the behaviour of actually exchanging the coupon for the product at the service desk might have allowed consumers to be "green to be seen" to a greater extent (Griskevicius et al., 2010). Our findings indicate the relevance between distinguishing between symbolic attributes tied to self-identity versus tied to social status when promoting plant-based food innovation adoption through promotional campaigns.

#### 4.1. Practical implications

Currently, campaigns that promote sustainable products such as plant-based food innovations often appeal to either instrumental or environmental product attributes, such as the taste of a product or the relatively low environmental impact of a product. However, when products are still novel and have low adoption rates, this might not always be the most fruitful strategy to promote adoption, particularly regarding instrumental attributes that are highlighted in campaigns. Innovative products are often characterized by certain instrumental drawbacks (Noppers et al., 2015), which has also been the case for plant-based food innovations in the perception of consumers in terms of for instance taste and price (Michel et al., 2021). Descriptively, this can also be seen in Study 1 where on average consumers were more positive regarding instrumental product attributes in the form of price ( $M = 5.32$ ), convenience ( $M = 5.34$ ), and sensory appeal ( $M = 5.17$ ) for bean products, than for seaweed products (price:  $M = 4.51$ , convenience:  $M = 4.75$ , sensory appeal:  $M = 4.51$ ; Table 1). Thus, consumers believed that bean products are more affordable, more convenient and have better sensory appeal, relative to seaweed products. This makes it more likely that these instrumental product attributes can function as barriers for adoption of plant-based food innovations. Moreover, as Study 1 showed, more positive consumer evaluations of instrumental product attributes such as price and convenience do not necessarily increase consumers' intention to adopt a plant-based food innovation.

Stressing symbolic attributes in campaigns for plant-based food innovations can be an alternative way to promote consumer adoption, especially when these products are still relatively novel, as more symbolic value can be derived from adoption when the mainstream does not adopt these products yet. As such, adoption of plant-based food innovations can be viewed as being part of a certain lifestyle, particularly a lifestyle in which pro-environmental actions are viewed as the right thing to do. For these consumers adoption is intrinsically rewarding; our findings provide initial indications that these symbolic attributes can be leveraged to affect consumer adoption of plant-based food innovations. This can be operationalized in promotional materials such as in our field experiment (Study 2), and be extended to items such as posters, flyers, and retail shelf cards, but also to online banners when shopping online. Future research can further explore which types of slogans and visuals can highlight symbolic product attributes of plant-based food innovations further when promoting its adoption. Based on our exploratory analyses regarding the relative predictive strength of different forms of symbolic attributes (tied to either self-identity or social status) on plant-based food innovation adoption (Study 1 & 2), the specific type of symbolic attribute to leverage to increase consumer adoption of plant-based food innovations should be taken into account. More specifically, combining our exploratory findings with previous findings that social status is mostly likely to be derived when sustainable actions are costly, visible and/or effortful (Uren et al., 2019), leveraging symbolic attributes of plant-based food innovations in the form of social status is more likely to be effective when adoption is costly, for instance because it is effortful

to purchase the product, or visible, such as in a public setting like a supermarket or restaurant where other patrons can also view the behaviour.

An added practical benefit of focusing on symbolic product attributes in campaigns is that derived symbolic value appears to be a largely unconscious, or at least unrecognized, process. This was shown in our first study, but also in earlier research (Noppers et al., 2014). Consequently, if a campaign addressing symbolic values succeeds in promoting initial adoption of a plant-based food innovation, it is more difficult for consumers to think of reasons of why they should not continue adopting. In contrast, sensory appeal is explicitly considered an important motive for adoption, but if a campaign stresses sensory appeal attributes and manages to promote initial adoption, continued adoption can be halted among consumers for whom the actual sensory appeal is a bit of a letdown (e.g., when they do not like the taste). Furthermore, campaigns that appeal to more intrinsic rewards, such as the symbolic value of plant-based food innovation adoption, overall are more likely to lead to more sustained adoption of new behaviour compared to when more extrinsic rewards are stressed (Van Der Linden, 2015).

#### 4.2. Limitations & future research

Our studies have some limitations, which also raise a number of avenues for future research. First, it should be noted that in our field experiment we did not find significant differences in adoption when stressing either type of symbolic attributes (tied to social status or self-identity) on promotional campaign materials, relative to a control group where the plant-based food innovation was also promoted, but where no specific product attributes were stressed. Thus, adjustments in the experimental set-up are needed to increase adoption relative to a control group, in addition to a larger sample size to increase the statistical power. Future research can further explore the role of visibility by systematically varying the degree of visibility of adoption (Uren et al., 2019) by for instance purposefully have people present where adoption is to occur (crowded service desk) or purposefully emptying this area (empty service desk), and test whether greater visibility also leads to higher adoption rates as a result of greater derived social status. Additionally, the promotional materials for our field study were not pre-tested. Further refinement of the slogans and icons used could contribute to increase the extent to which the promotional materials make symbolic product attributes of plant-based food innovations salient, related to either expressions of self-identity or social status. Second, future research could explore the effect of stressing the two types of symbolic attributes in campaigns on adoption in natural settings that by default are less visible and effortful. While we used a bricks-and-mortar supermarket for our natural experiment, many consumers increasingly buy products online. Online shopping is less visible, as other people do not witness what you buy, and less effortful, as online shopping typically is viewed as more convenient than shopping in bricks-and-mortar stores (Pate and Adams, 2013). Therefore, future research could explore whether in a natural online shopping environment, stressing symbolic attributes tied to consumers' self-identity promotes plant-based food innovation adoption to a greater extent, rather than stressing symbolic attributes tied to social status. Third, there might be certain conditions under which adoption is particularly affected by symbolic attributes tied to self-identity, in addition to the aforementioned more private-sphere (e.g., online) settings. Research has shown that the extent to which consumers aim to be consistent in their pro-environmental actions strengthens the effect of environmental self-identity on adoption (Peters et al., 2018). This suggests that when consumers are reminded of previously having made a pro-environmental decision, stressing symbolic attributes tied to consumers' self-identity is more likely to promote adoption, because of a need to act consistently. Another relevant factor may be autonomy in adopting plant-based food innovations, as behaviour that is performed voluntarily is more likely to be attributed to one's self-identity (Venhoeven et al., 2016). Finally, in Study 1 we used seaweed products and bean

products to operationalize plant-based food innovations and non-innovative plant-based food products, where the findings showed that symbolic attributes predict adoption intention of seaweed products but not of bean products. Future research can use other operationalizations for plant-based innovations and non-innovative plant-based products, for instance in the domain of dairy using plant-based milk and cow milk or plant-based cheese and cheese derived from cow milk, to further examine whether symbolic attributes indeed predict adoption intention of mainly innovative plant-based food products, but not of their non-innovative, longer-existing counterpart.

#### 4.3. Conclusions

Together, our studies suggest that even though symbolic value of plant-based food innovations appears to be largely unrecognized by consumers, leveraging symbolic attributes of plant-based food innovations can contribute to promote plant-based food innovation adoption. At least part of the meaning that consumers derive from a plant-based food innovation, comes from adoption signifying either to themselves or to others that consumers find it intrinsically rewarding to act in an environmentally-friendly manner by adopting a plant-based food innovation. Leveraging these intrinsically rewarding symbolic attributes of plant-based food innovations can be an alternative way to drive consumer adoption.

#### Conflict of interest

The authors declare that they have no conflict of interest.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.crc.2022.100050>.

#### References

- Aschemann-Witzel, J., Gantriis, R.F., Fraga, P., Perez-Cueto, F.J., 2021. Plant-based food and protein trend from a business perspective: markets, consumers, and the challenges and opportunities in the future. *Crit. Rev. Food Sci. Nutr.* 1–10. <https://doi.org/10.1080/10408398.2020.1793730>.
- Berger, J., Heath, C., 2007. Where consumers diverge from others: identity signaling and product domains. *J. Consum. Res.* 34 (2), 121–134.
- Birch, D., Skallerud, K., Paul, N., 2019. Who eats seaweed? An Australian perspective. *J. Int. Food & Agribus. Mark.* 31 (4), 329–351.
- Bolderdijk, J.W., Cornelissen, G., 2022. "How Do You Know Someone's Vegan?" They Won't Always Tell You an Empirical Test of the Do-Gooder's Dilemma. *Appetite*, p. 105719. <https://doi.org/10.1016/j.appet.2021.105719>.
- Camilleri, A.R., Larrick, R.P., Hossain, S., Patino-Echeverri, D., 2019. Consumers underestimate the emissions associated with food but are aided by labels. *Nat. Clim. Change* 9 (1), 53–58. <https://doi.org/10.1038/s41558-018-0354-z>.
- Curtain, F., Grafenauer, S., 2019. Plant-based meat substitutes in the flexitarian age: an audit of products on supermarket shelves. *Nutrients* 11 (11), 2603. <https://doi.org/10.3390/nu11112603>.
- Dittmar, H., 1992. *The Social Psychology of Material Possessions: to Have Is to Be*. Hemel Hempstead. Harvester Wheatsheaf.
- Faul, F., Erdfelder, E., Lang, A.G., Buchner, A., 2007. G\*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* 39, 175–191. <https://doi.org/10.3758/BF03193146>.
- Gärling, T., Fujii, S., Gärling, A., Jakobsson, C., 2003. Moderating effects of social value orientation on determinants of proenvironmental behavior intention. *J. Environ. Psychol.* 23 (1), 1–9. [https://doi.org/10.1016/S0272-4944\(02\)00081-6](https://doi.org/10.1016/S0272-4944(02)00081-6).
- Gatersleben, B., van der Werff, E., 2018. Symbolic aspects of environmental behaviour. In: *Environmental Psychology: an Introduction*. Wiley-Blackwell, pp. 198–206.
- Gkargkavouzi, A., Halkos, G., Matsiori, S., 2019. Environmental behavior in a private-sphere context: integrating theories of planned behavior and value belief norm, self-identity and habit. *Resour. Conserv. Recycl.* 148, 145–156. <https://doi.org/10.1016/j.resconrec.2019.01.039>.
- Graham, T., Abrahamse, W., 2017. Communicating the climate impacts of meat consumption: the effect of values and message framing. *Global Environ. Change* 44, 98–108. <https://doi.org/10.1016/j.gloenvcha.2017.03.004>.
- Griskevicius, V., Tybur, J.M., Van den Bergh, B., 2010. Going green to be seen: status, reputation, and conspicuous conservation. *J. Pers. Soc. Psychol.* 98 (3), 392–404. <https://doi.org/10.1037/a0017346>.
- Hagmann, D., Siegrist, M., Hartmann, C., 2019. Meat avoidance: motives, alternative proteins and diet quality in a sample of Swiss consumers. *Publ. Health Nutr.* 22 (13), 2448–2459. <https://doi.org/10.1017/S1368980019001277>.
- Hayes, A.F., 2012. *PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling*.
- Hayes, A.F., 2018. Partial, conditional, and moderated moderated mediation: quantification, inference, and interpretation. *Commun. Monogr.* 85 (1), 4–40. <https://doi.org/10.1080/03637751.2017.1352100>.
- Hunt, D.M., Radford, S.K., Evans, K.R., 2013. Individual differences in consumer value for mass customized products. *J. Consum. Behav.* 12 (4), 327–336. <https://doi.org/10.1002/cb.1428>.
- Jallinoja, P., Niva, M., Latvala, T., 2016. Future of sustainable eating? Examining the potential for expanding bean eating in a meat-eating culture. *Futures* 83, 4–14. <https://doi.org/10.1016/j.futures.2016.03.006>.
- Januszevska, R., Pieniak, Z., Verbeke, W., 2011. Food choice questionnaire revisited in four countries. Does it still measure the same? *Appetite* 57 (1), 94–98. <https://doi.org/10.1016/j.appet.2011.03.014>.
- Jia, L., van der Linden, S., 2020. Green but not altruistic warm-glow predicts conservation behavior. *Conservation Science and Practice* 2 (7), e211. <https://doi.org/10.1111/csp2.211>.
- Kause, A., de Bruin, W.B., Millward-Hopkins, J., Olsson, H., 2019. Public perceptions of how to reduce carbon footprints of consumer food choices. *Environ. Res. Lett.* 14, 114005. <https://doi.org/10.1088/1748-9326/ab465d>.
- Koenig-Lewis, N., Palmer, A., Dermody, J., Urbye, A., 2014. Consumers' evaluations of ecological packaging—Rational and emotional approaches. *J. Environ. Psychol.* 37, 94–105. <https://doi.org/10.1016/j.jenvp.2013.11.009>.
- Markowski, K.L., Roxburgh, S., 2019. "If I became a vegan, my family and friends would hate me." Anticipating vegan stigma as a barrier to plant-based diets. *Appetite* 135, 1–9. <https://doi.org/10.1016/j.appet.2018.12.040>.
- Michel, F., Hartmann, C., Siegrist, M., 2021. Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives. *Food Qual. Prefer.* 104063. <https://doi.org/10.1016/j.foodqual.2020.104063>.
- Minson, J.A., Monin, B., 2012. Do-gooder derogation: disparaging morally motivated minorities to defuse anticipated reproach. *Social Psychological and Personality Science* 3 (2), 200–207. <https://doi.org/10.1177/1948550611415695>.
- Mohamed, S., Hashim, S.N., Rahman, H.A., 2012. Seaweeds: a sustainable functional food for complementary and alternative therapy. *Trends Food Sci. Technol.* 23 (2), 83–96. <https://doi.org/10.1016/j.tifs.2011.09.001>.
- Myers, G., Pettigrew, S., 2018. A qualitative exploration of the factors underlying seniors' receptiveness to entomophagy. *Food Res. Int.* 103, 163–169. <https://doi.org/10.1016/j.foodres.2017.10.032>.
- Nolan, J.M., Schultz, P.W., Cialdini, R.B., Goldstein, N.J., Griskevicius, V., 2008. Normative social influence is underdetected. *Pers. Soc. Psychol. Bull.* 34 (7), 913–923. <https://doi.org/10.1177/0146167208316691>.
- Noppers, E.H., Keizer, K., Bolderdijk, J.W., Steg, L., 2014. The adoption of sustainable innovations: driven by symbolic and environmental motives. *Global Environ. Change* 25, 52–62. <https://doi.org/10.1016/j.gloenvcha.2014.01.012>.
- Noppers, E.H., Keizer, K., Bockarjova, M., Steg, L., 2015. The adoption of sustainable innovations: the role of instrumental, environmental, and symbolic attributes for earlier and later adopters. *J. Environ. Psychol.* 44, 74–84. <https://doi.org/10.1016/j.jenvp.2015.09.002>.
- Onwezen, M.C., Van den Puttelaar, J., Verain, M.C.D., Veldkamp, T., 2019. Consumer acceptance of insects as food and feed: the relevance of affective factors. *Food Qual. Prefer.* 77, 51–63. <https://doi.org/10.1016/j.foodqual.2019.04.011>.
- Pate, S.S., Adams, M., 2013. The influence of social networking sites on buying behaviors of millennials. *Atlantic Marketing Journal* 2 (1), 7.
- Perrea, T., Krystallis, A., Engelgreen, C., Chrysochou, P., 2017. Much too new to eat it? Customer value and its impact on consumer-product relationship in the context of novel food products. *J. Prod. Brand Manag.* 26 (6), 616–630. <https://doi.org/10.1108/JPBMM-09-2015-0984>.
- Peters, A.M., van der Werff, E., Steg, L., 2018. Beyond purchasing: electric vehicle adoption motivation and consistent sustainable energy behaviour in The Netherlands. *Energy Res. Social Sci.* 39, 234–247. <https://doi.org/10.1016/j.erss.2017.10.008>.
- Poore, J., Nemecek, T., 2018. Reducing food's environmental impacts through producers and consumers. *Science* 360 (6392), 987–992. <https://doi.org/10.1126/science.aag0216>.

- ProVeg, 2021. Plant-based foods in Europe: how big is the market? Smart protein plant-based food sector report. <https://smartproteinproject.eu/plant-based-food-sector-report>.
- Puska, P., Kurki, S., Lähdesmäki, M., Siltaoja, M., Luomala, H., 2018. Sweet taste of prosocial status signaling: when eating organic foods makes you happy and hopeful. *Appetite* 121, 348–359. <https://doi.org/10.1016/j.appet.2017.11.102>.
- Ravasi, D., Rindova, V., 2008. Symbolic Value Creation. *Handbook of New Approaches to Organization*, pp. 270–284.
- Sahlin, K.R., Rööös, E., Gordon, L.J., 2020. 'Less but better' meat is a sustainability message in need of clarity. *Nature Food* 1 (9), 520–522.
- Schneider, C.R., Zaval, L., Markowitz, E.M., 2021. Positive emotions and climate change. *Current Opinion in Behavioral Sciences* 42, 114–120. <https://doi.org/10.1016/j.cobeha.2021.04.009>.
- Siegrist, M., Hartmann, C., 2019. Impact of sustainability perception on consumption of organic meat and meat substitutes. *Appetite* 132, 196–202. <https://doi.org/10.1016/j.appet.2018.09.016>.
- Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B.L., Lassaletta, L., de Vries, W., Vermeulen, S.J., Herrero, M., Carlson, K.M., Jonell, M., 2018. Options for keeping the food system within environmental limits. *Nature* 562 (7728), 519–525. <https://doi.org/10.1038/s41586-018-0594-0>.
- Steenhuis, I.H., Waterlander, W.E., de Mul, A., 2011. Consumer food choices: the role of price and pricing strategies. *Publ. Health Nutr.* 14 (12), 2220–2226. <https://doi.org/10.1017/S1368980011001637>.
- Stok, F.M., Hoffmann, S., Volkert, D., Boeing, H., Ensenaer, R., Stelmach-Mardas, M., Kiesswetter, E., Weber, A., Rohm, H., Lien, H., Brug, J., Holdsworth, M., Renner, B., 2017. The DONE framework: creation, evaluation, and updating of an interdisciplinary, dynamic framework 2.0 of determinants of nutrition and eating. *PLoS One* 12 (2), e0171077. <https://doi.org/10.1371/journal.pone.0171077>.
- Taufik, D., Bolderdijk, J.W., Steg, L., 2015. Acting green elicits a literal warm glow. *Nat. Clim. Change* 5 (1), 37–40. <https://doi.org/10.1038/NCLIMATE2449>.
- Taufik, D., Bolderdijk, J.W., Steg, L., 2016. Going green? The relative importance of feelings over calculation in driving environmental intent in The Netherlands and the United States. *Energy Res. Social Sci.* 22, 52–62. <https://doi.org/10.1016/j.erss.2016.08.012>.
- Taufik, D., 2018. Prospective “warm-glow” of reducing meat consumption in China: emotional associations with intentions for meat consumption curtailment and consumption of meat substitutes. *J. Environ. Psychol.* 60, 48–54. <https://doi.org/10.1016/j.jenvp.2018.10.004>.
- Tilman, D., Clark, M., 2014. Global diets link environmental sustainability and human health. *Nature* 515 (7528), 518–522. <https://doi.org/10.1038/nature13959>.
- Uren, H.V., Roberts, L.D., Dzidic, P.L., Leviston, Z., 2019. High-status Pro- Environmental Behaviors: Costly, Effortful, and Visible. *Environment and Behavior*. <https://doi.org/10.1177/0013916519882773>, 0013916519882773.
- van den Burg, S.W.K., Dagevos, H., Helmes, R.J.K., 2021. Towards sustainable European seaweed value chains: a triple P perspective. *ICES (Int. Coun. Explor. Sea) J. Mar. Sci.* 78 (1), 443–450.
- Van Der Linden, S., 2015. Intrinsic motivation and pro-environmental behaviour. *Nat. Clim. Change* 5 (7), 612–613. <https://doi.org/10.1038/nclimate2669>.
- van der Linden, S., 2018. Warm glow is associated with low-but not high-cost sustainable behaviour. *Nat. Sustain.* 1 (1), 28–30. <https://doi.org/10.1038/s41893-017-0001-0>.
- Van der Werff, E., Steg, L., Keizer, K., 2013. It is a moral issue: the relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Global Environ. Change* 23 (5), 1258–1265. <https://doi.org/10.1016/j.gloenvcha.2013.07.018>.
- Venhoeven, L.A., Bolderdijk, J.W., Steg, L., 2016. Why acting environmentally-friendly feels good: exploring the role of self-image. *Front. Psychol.* 7, 1846. <https://doi.org/10.3389/fpsyg.2016.01846>.
- Venhoeven, L.A., Bolderdijk, J.W., Steg, L., 2020. Why going green feels good. *J. Environ. Psychol.* 101492. <https://doi.org/10.1016/j.jenvp.2020.101492>.
- Webb, T.L., Sheeran, P., 2006. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychol. Bull.* 132 (2), 249–268. <https://doi.org/10.1037/0033-2909.132.2.249>.
- White, K., Habib, R., Hardisty, D.J., 2019. How to SHIFT consumer behaviors to be more sustainable: a literature review and guiding framework. *J. Market.* 83 (3), 22–49. <https://doi.org/10.1177/0022242919825649>.
- Whitnall, T., Pitts, N., 2019. Global trends in meat consumption. *Agric. Commod.* 9 (1), 96.
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J., De Vries, W., Majele Sibanda, L., Afshin, A., Chaudhary, A., Herrero, M., Agustina, R., Branca, F., Lartey, A., Fan, S., Crona, B., Fox, E., Bignet, V., Troell, M., Lindahl, T., Singh, S., Cornell, S., Srinath Reddy, K., Narain, S., Nishtar, S., Murray, C., 2019. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *Lancet* 393 (10170), 447–492. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4).
- Zhao, X., Lynch Jr., J.G., Chen, Q., 2010. Reconsidering baron and kenny: myths and truths about mediation analysis. *J. Consum. Res.* 37 (2), 197–206. <https://doi.org/10.1086/651257>.